PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference LIC 8B PCT	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/FI2004/000683	International filing date *(day/month/year)* 15.11.2004	Priority date *(day/month/year)* 14.11.2003
International Patent Classification (IPC) or national classification and IPC INV. H01J49/00		
Applicant LICENTIA OY et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *sent to the applicant and to the International Bureau)* a total of sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand 13.09.2005	Date of completion of this report 13.07.2006
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Peters, V Telephone No. +31 70 340-4857

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Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:

   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-17	as published
Claims, Numbers	
1-32	as published
Drawings, Sheets	
1/5-5/5	as published

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 10-11, 14-16, 27-29

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*.

☒ no international search report has been established for the said claims Nos. 10-11, 14-16, 27-29

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b) and 13*ter*.2.

☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions, and such tables were not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☒ See separate sheet for further details

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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation to restrict or pay additional fees, the applicant has, within the applicable time limit:

   ☐ restricted the claims.

   ☐ paid additional fees.

   ☐ paid additional fees under protest and, where applicable, the protest fee.

   ☐ paid additional fees under protest but the applicable protest fee was not paid.

   ☒ neither restricted the claims nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:

   ☒ complied with.

   ☐ not complied with for the following reasons:

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-9, 12-13, 17-26, 30-32 .

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-9, 12-13, 17-26, 30-32
	No:	Claims	
Inventive step (IS)	Yes:	Claims	4, 20
	No:	Claims	1-3, 5-9, 12, 13, 17-19, 21-26, 30-32
Industrial applicability (IA)	Yes:	Claims	1-9, 12-13, 17-26, 30-32
	No:	Claims	

2. Citations and explanations (Rule 70.7):

   see separate sheet

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Re Items III and IV

With regard to the non-unity reasoning given in the WOISA it is noted that the claims 27 and 28 were included by mistake in both invention 1 and invention 3. In view of the subject matter of claims 27 and 28 it is considered that said claims actually belong to invention 3 and not to invention 1 and their subject matter is not covered by the documents cited in the search report. This mistake has been corrected in the present report.

Except for the above remark the reasoning regarding non-unity given in the WOISA remains valid.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The following reasoned statement is made only with regard to claims 1-9, 12-13, 17-26 and 30-32 considered to belong to invention 1 in the reasoning regarding non-unity as set out in the WOISA and the present report.

Reference is made to the following documents:

D1: US 6 610 978 B
D2: EP 0 452 930 A
D4: WO 00 41214 A

Upon further study of the documents mentioned in the search report the document D1 is not considered to be particularly relevant as it does not mention or suggest the use of corona discharge or APCI ionization. However, the document D4 is considered to be relevant prior art for the reasons laid out below.

1 **Independent claim 1**

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

The document D4 discloses a method of examining a sample by means of mass spectrometry (p. 20, l. 29 - p. 21, l. 14), according to which method
- ions are produced by an electrospray device which is manufactured as a micromechanical structure (fig. 1)
- the ions are separated (p. 20, l. 29 - p. 21, l. 14; implicit in mass spectrometry) and directed to a detector (p. 20, l. 29 - p. 21, l. 14; implicit),
- using a vaporiser which is fabricated as a micromechanical structure (fig. 1; 10, 14).

The subject-matter of claim 1 therefore differs from this known method in that the solution comprising the sample to be examined is vaporised in a vaporiser and the vaporised sample solution is sprayed, using a gas flow, into a corona discharge zone, where the sample to be examined is ionised using a corona discharge to generate gas phase ions.

The problem to be solved by the present invention may therefore be regarded as employing an alternative ionization mechanism.

In view of document D4 p. 20, l. 29 - p. 21, l. 14 which states itself that the use of the above micromechanical structure for APCI/MS instead of electrospray ionization is envisaged, the skilled person would regard it a normal design procedure to adapt the micromechanical structure for APCI which would include all the features set out in claim 1.

2 **Independent claim 17**

The argument against the method of claim 1 applies *mutatis mutandis* to the device of claim 17.

3 **Independent claim 30**

The reasoning against claim 1 applies, mutatis mutandis, to the subject-matter of independent claim 30.

4 **Dependent claims 2, 3, 5-9, 12, 13, 18, 19, 21-26, 31, 32**

Dependent claims 2, 5, 18, 22 and 23 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step over the disclosure of document D4 in combination with the corona discharge device with an additional heater as disclosed in document D2 (see fig. 1; 7).

Dependent claims 6, 7, 8, 13, 19, 21 and 24 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (see document D4, fig. 1; p. 20, l. 29 - p. 21, l. 14).

Dependent claims 3, 9, 12, 25, 26, 31 and 32 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step over the disclosure of document D4 as the features are considered to be conventional in the art.

5 **Dependent claims 4 and 20**

The combination of the features of dependent claims 4 and 20 is neither known from, nor rendered obvious by, the available prior art. The reasons are as follows:

The difference between the subject matter of claims 4 and 20 and the available prior art is the integration of the corona discharge zone into the micromechanical structure.

This solves the problem of allowing a more compact construction of the device.

The integration of a corona discharge zone into a micromechanical structure is neither known nor suggested by the prior art, which only suggests to use an external corona discharge needle (see e. g. document D2, fig. 1).